

AbstractID: 11521 Title: The use of TomoDose for TomoTherapy MLC alignment verification

Purpose: To develop a method of using TomoDose (Sun Nuclear Corp.), a daily QA device for TomoTherapy, to verify MLC lateral alignment after service or replacement. **Method and Materials:** Baseline TomoTherapy beam profiles of 1.1 cm, 2.5 cm and 5.0 cm x 40.0 cm were obtained by carrying out TomoDose measurements at the standard isocenter position. The profiles were modified by using an alternating MLC pattern of three open then three closed leaves thereby generating a fingerprint of peaks. The profiles were normalized to detector #51 located at one centimeter lateral to the central axis. TomoDose peak heights corresponding to the open leaf positions were then evaluated. Lateral offsets, simulating an MLC replacement error, were set at 0.0, -0.2, -0.4 and -0.6 mm from central axis. Standard EDR2 film was also used for the same verification. **Results:** Prior to any offsets the central axis detector #53 value was 49.12 +/- 1.88 (standard deviation). After a -0.2 mm lateral offset the value dropped to 43.66. Offsets of -0.4 mm and -0.6 mm resulted in further drops to 40.41 and 36.28 respectively. Parallel film measurements were not as sensitive in determining offsets. TomoDose peak height at detector #53 changed by approximately 5 percentage points for every 0.1 mm offset in the lateral MLC position. **Conclusion:** MLC service or replacement is common on TomoTherapy. Film-based lateral MLC alignment is difficult to determine with better than 0.5 mm resolution due to processor/film instability. We have determined that TomoDose used with an alternating leaf pattern is sensitive enough to determine a lateral MLC replacement error as small as 0.2 mm.